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CALIFORNIA ETHANOL Project Overview
Ethanol Conversion
Barry Duffin


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Project Goals
• Eliminate MTBE in California Gasoline
• Introduce Ethanol through oxygenate blending at terminal load racks
• Maintain consistent supply and quality of California Gasoline at all retail outlets.

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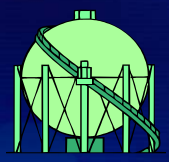
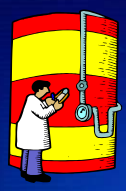
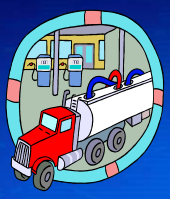
Considerations



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Scope Description

- Project Planning and Management
- Refinery Blend Slate vs. Ethanol Specifications
- Refinery and Terminal MTBE Phase out and CARBOB Conversion
- Ethanol compatibility with Terminal and Retail equipment
- Terminal load rack preparation for ethanol blending
- Retail UST preparation for Ethanol Blended gasoline conversion
- Ethanol Supply, Logistics and Storage
- Quality Oversight of Ethanol Inventory and Blending

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Refinery and Terminal Preparation

- Refineries (2 Internal)
  - Blend Slate / RVP / Octane / Specifications
  - Ethanol Storage / Tank realignment
  - Blend certification
- Terminals (4 Internal)
  - Ethanol storage tank preparation
  - Ethanol receipt and shipping modes
  - Blending, load rack piping, blend meter calibration (VCFs)
  - Blending oversight (sequential vs. ratio)
  - Ethanol fire fighting foam

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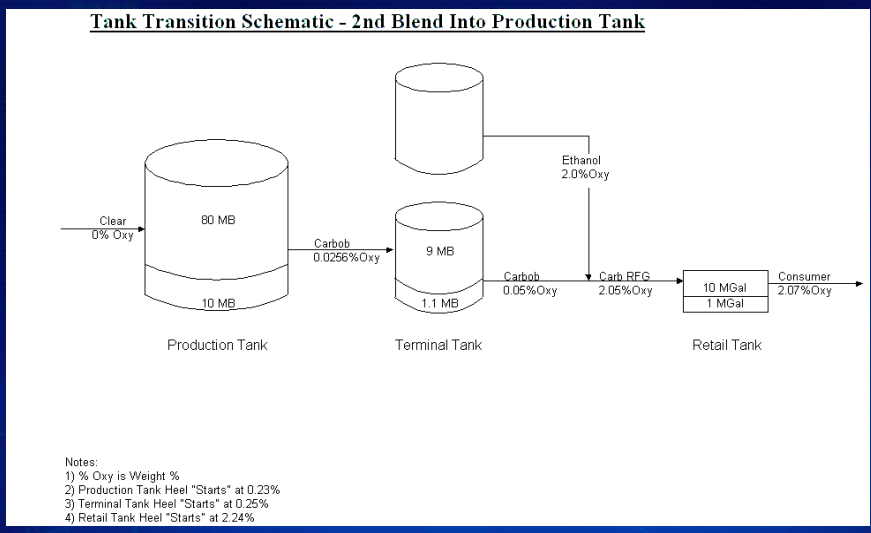

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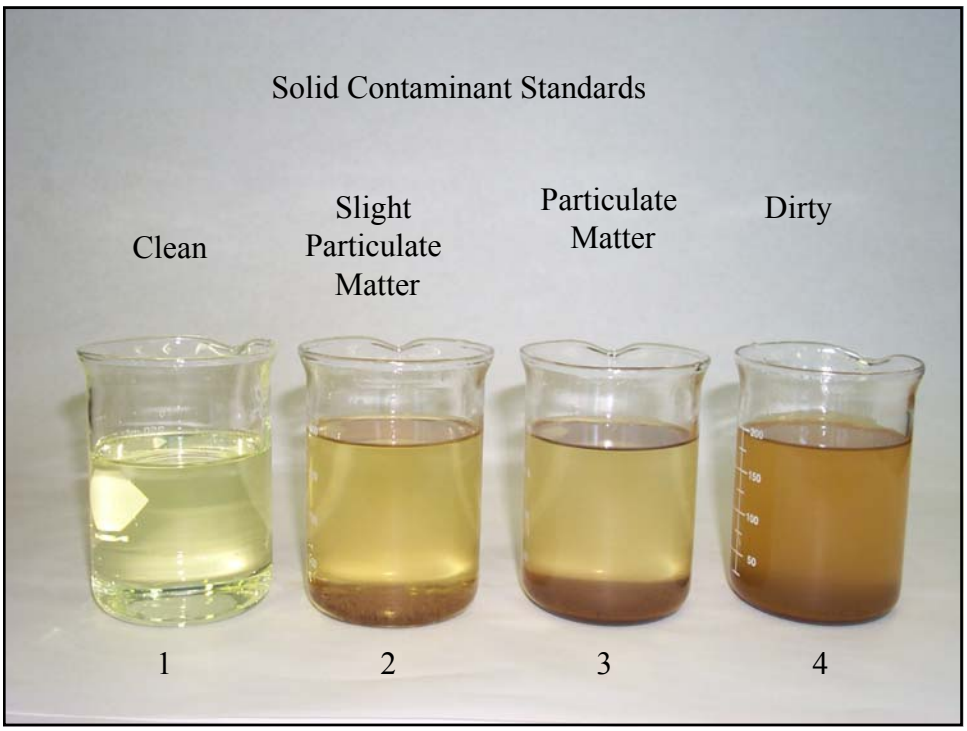
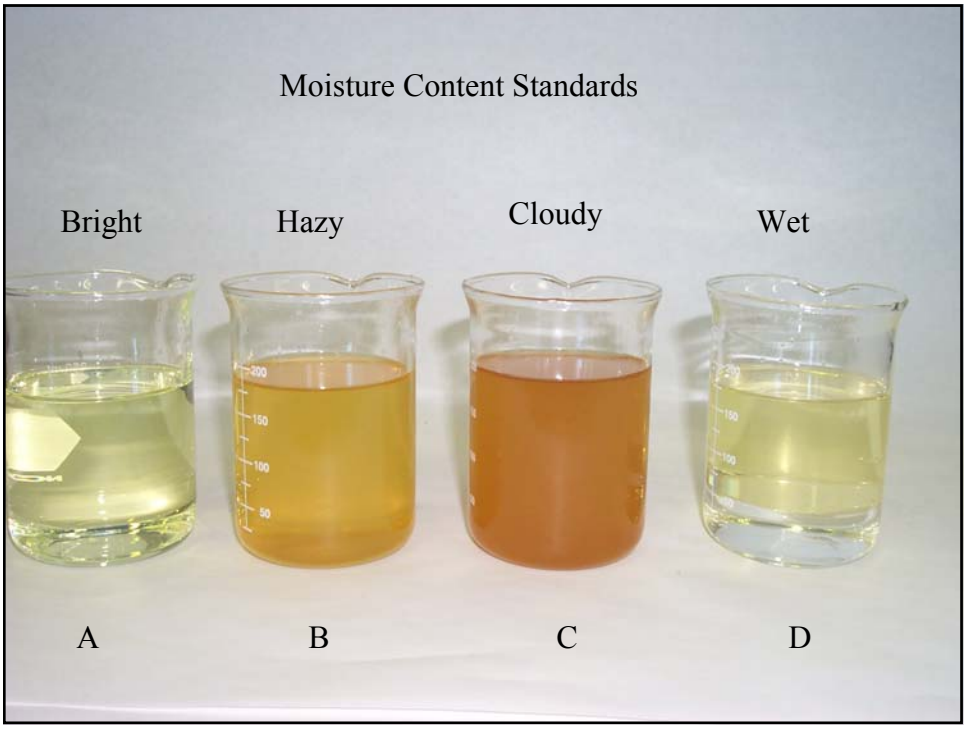
Retail Preparation

- Resources
  - 4 Managers
  - Special Training
  - Special Procedures
  - 5 Contractors
  - 120 Days
- 3000 USTs
  - 2600+ Inspected
  - 185 Cleaned (7%)
- Compatibility
  - Filters,
  - Pumps
  - Labels
  - Ethanol Water Paste




Moisture Content Standards
Bright
Hazy
Cloudy
Wet
A
B
C
D


E
Surfactants

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Ethanol Supply Issues

- Lack of consistent Volumetric Measurement
- Inconsistent Quality Certifications
  - Test results seldom include all ASTM D-4806 requirements
  - Product Identification and Traceability needs improvement

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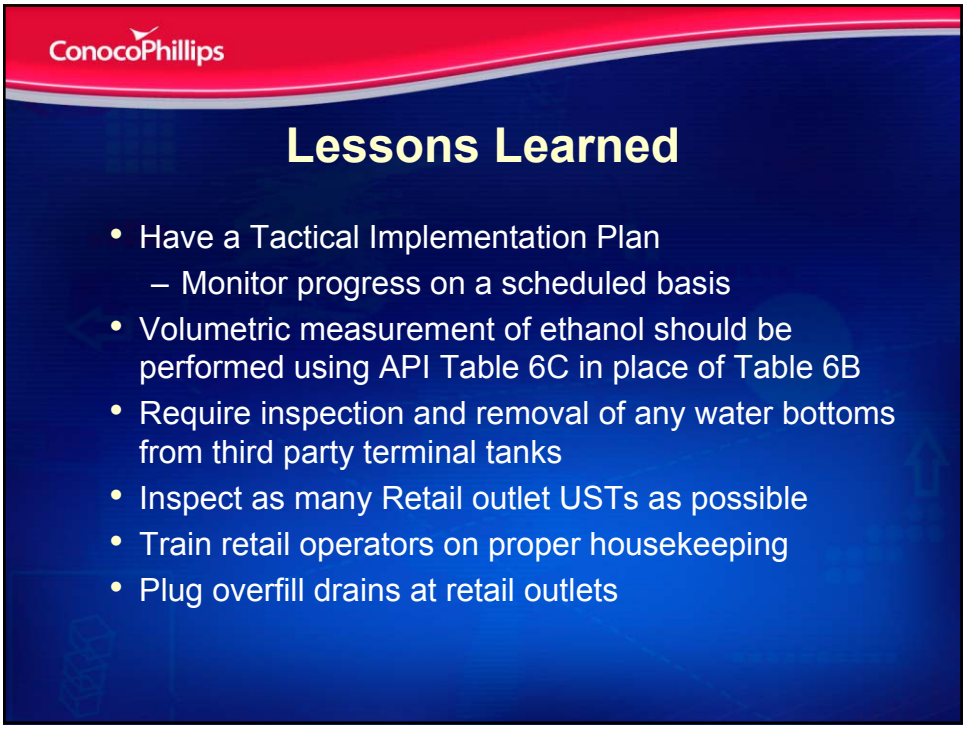
Specification

Denatured Fuel Ethanol (1)
Basic Requirements
On each occasion that Ethanol is supplied, the following shall apply:
Suppliers shall provide a Certificate of Conformance identifying the test results which show that the denatured ethanol complies with ASTM D4806 and the specifications below.
The only denaturants shall be natural gasoline, gasoline components, or unleaded gasoline.
Specification Requirements

Specification	Test Method	Value		Notes
		Min	Max	
Fuel Ethanol	ASTM D5501	95.0		(6)
Neat Ethanol Vol%	ASTM D5501	92.1		(7)
Methanol Vol%			0.5	
Denaturant Content, vol.%,		1.96	4.76	
Existent Gum, mg/100ml	ASTM D-381		5.0	
Water Content, vol%	ASTM E203 or E1064		1.0	
Inorganic Chloride Content, ppm, (mg/L)	ASTM D512, Proc. C (modified)		40 (32)	(4)
Copper Content, mg/kg	ASTM D1688, Proc. D (modified)		0.1	(4)
Acidity (as acetic acid), wt%, (mg/L)	ASTM D1613		0.007 (56)	(5)
Phe	ASTM D 6423	6.5	9.0	
Appearance	ASTM D4806	C&B		(2)
Sulfur	ASTM D2622	Report		
Corrosion Inhibitor XXX	XXX	20	40	(3)
Reid Vapor Pressure Psi	ASTM D5191		4.5	
Nace Rust	TM-01-73	Report		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Lessons Learned
• Have a Tactical Implementation Plan
– Monitor progress on a scheduled basis
• Volumetric measurement of ethanol should be performed using API Table 6C in place of Table 6B
• Require inspection and removal of any water bottoms from third party terminal tanks
• Inspect as many Retail outlet USTs as possible
• Train retail operators on proper housekeeping
• Plug overfill drains at retail outlets